

## DESIGN FOR SUPPORTABILITY

102

Commonality 104	Modularity 106	Standards Based 108	RMT 110
<ul style="list-style-type: none"> <li>Physical Commonality (Within this system)               <ul style="list-style-type: none"> <li>HW Commonality                   <ul style="list-style-type: none"> <li>Number of Unique LRU's</li> <li>Number of Unique Fasteners</li> <li>Number of Unique Cables</li> </ul> </li> <li>Number of Unique Standards Implemented</li> <li>SW Commonality                   <ul style="list-style-type: none"> <li>Number of Unique SW Packages Implemented</li> </ul> </li> <li>Number of Languages</li> <li>Number of Compilers</li> <li>Average Number of SW Installations</li> <li>Number of Unique Standards Implemented</li> </ul> </li> <li>Physical Family (From other systems)               <ul style="list-style-type: none"> <li>Vendors known</li> <li>Subcontractors known</li> <li>% HW Technology known</li> <li>% SW Technology known</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Physical Modularity 118               <ul style="list-style-type: none"> <li>Ease of system element upgrade</li> <li>Lines of modified code</li> <li>Amount of labour hours for system rework</li> <li>Ease of operating system upgrade</li> <li>Lines of modified code</li> <li>Amount of labour hours for system rework</li> </ul> </li> <li>Functional Modularity 120               <ul style="list-style-type: none"> <li>Ease of adding new functionality</li> <li>Lines of modified code</li> <li>Amount of labour hours for system rework</li> <li>Ease of upgrading existing functionality</li> <li>Lines of modified code</li> <li>Amount of labour hours for system rework</li> </ul> </li> <li>Orthogonality 122               <ul style="list-style-type: none"> <li>Are functional requirements segmented across multiple processing elements and interfaces?</li> <li>Are there throughput requirements across interfaces?</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Open Systems Orientation 128               <ul style="list-style-type: none"> <li>Interface Standards                   <ul style="list-style-type: none"> <li># of Interface Standards</li> <li>Interfaces                       <ul style="list-style-type: none"> <li>Multiple Vendors (Greater than 5)</li> </ul> </li> <li>Standard Products Based on Standards</li> </ul> </li> <li>Multiple Business Domains               <ul style="list-style-type: none"> <li>Apply Use Standard (Aerospace, Medical, Telecommunications)</li> </ul> </li> <li>Hardware Standards               <ul style="list-style-type: none"> <li>Standard Modularity</li> <li># of Form Factors</li> <li># of LRU's</li> <li>Multiple Vendors (Greater than 5)</li> </ul> </li> <li>Exist for Products Based on Standards               <ul style="list-style-type: none"> <li>Multiple Business Domains                   <ul style="list-style-type: none"> <li>Apply Use Standard (Aerospace, Medical, Telecommunications)</li> </ul> </li> <li>Standard Modularity</li> </ul> </li> <li>Software Standards               <ul style="list-style-type: none"> <li># of propriety &amp; unique operating systems</li> <li># of non-old databases</li> <li># of proprietary middle-ware</li> <li># of non-old languages</li> </ul> </li> <li>Consistency Orientation 130               <ul style="list-style-type: none"> <li>Common Guidelines for Implementing Diagnostics and PMFL</li> <li>Common Guidelines for Implementing OMI</li> </ul> </li> </ul> </li></ul>	<ul style="list-style-type: none"> <li>Reliability 132               <ul style="list-style-type: none"> <li>Fault Tolerance                   <ul style="list-style-type: none"> <li>% of mission critical functions with single points of failure</li> <li>% of safety critical functions with single points of failure</li> </ul> </li> <li>Critical Points of Delicateness (System Loading)                   <ul style="list-style-type: none"> <li>% Processor Loading</li> <li>% Memory Loading</li> <li>% Network Loading</li> <li>How critical is this?</li> <li>How critical is this?</li> </ul> </li> <li>Maintainability 134                   <ul style="list-style-type: none"> <li>Expected MTTR                       <ul style="list-style-type: none"> <li>Is system operational during maintenance?</li> </ul> </li> <li>Accessibility                       <ul style="list-style-type: none"> <li>Are there access restrictions?</li> <li>Are there special tool requirements?</li> <li>Are there special skill requirements?</li> </ul> </li> </ul> </li> <li>Testability 136               <ul style="list-style-type: none"> <li># of LRU's covered by BIT (BIT Coverage)</li> <li>Reproducibility of Errors                   <ul style="list-style-type: none"> <li>Logging/Recording Capability</li> <li>Create system state at time of system failure?</li> </ul> </li> <li>Online Testing                   <ul style="list-style-type: none"> <li>Is system operational during external testing?</li> </ul> </li> <li>Ease of access to external testpoints?</li> <li>Automated Input/Output Simulation</li> </ul> </li></ul></li></ul>

FIG. 1

200

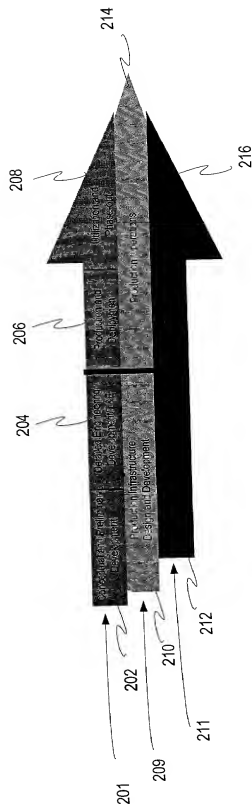


FIG. 2A

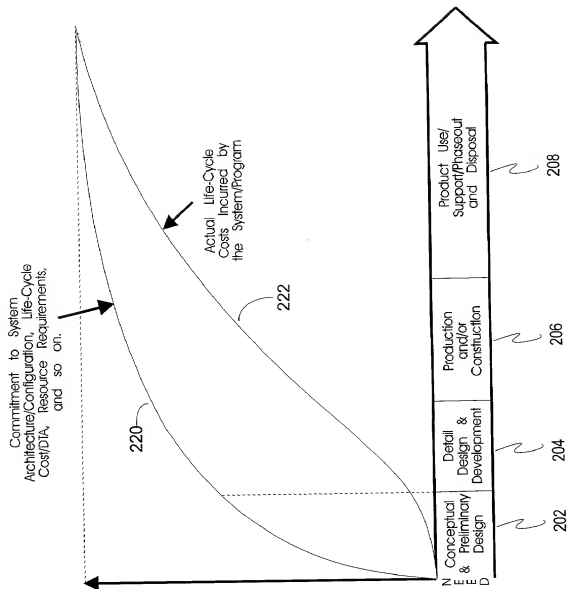


FIG. 2B



300

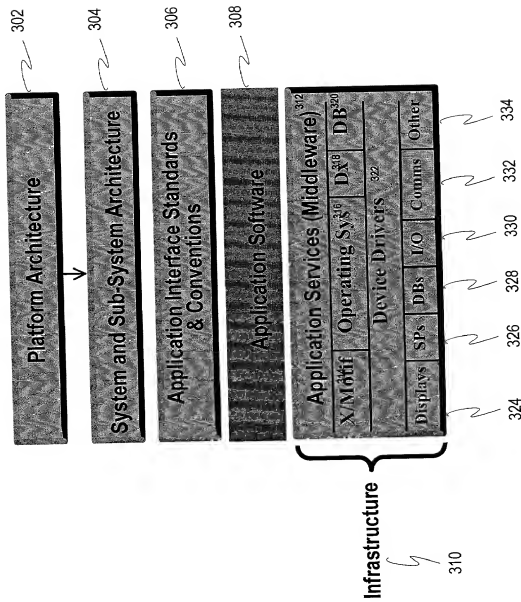


FIG. 3

400

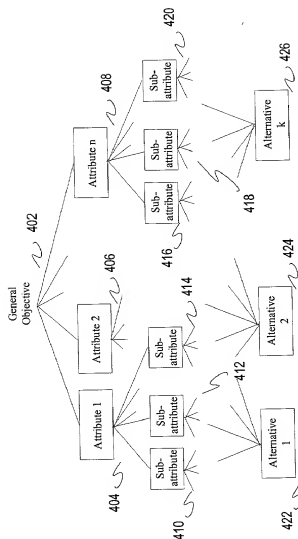


FIG. 4

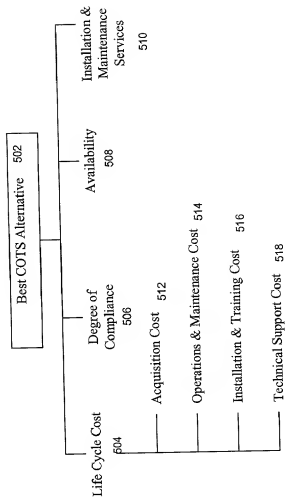


FIG. 5





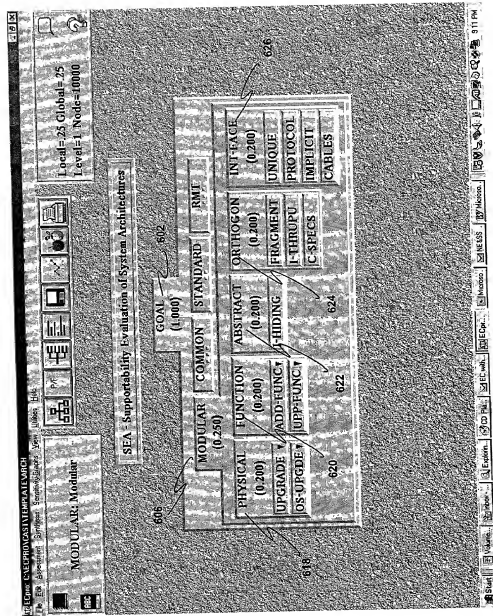


FIG. 6B



GOAL-SEA: Sustainability Evaluation of Systems Architectures  
 12: 12:00 PM 10/20/2011

Preliminary Verbal Matrix Questionnaire Graphic

With respect to GOAL:  
 MODULAR Modular  
 is 5.0 times (STRONGLY) more IMPORTANT than  
 COMMON: Common

Best Fit	COMMON	STANDARD	WMT
MODULAR	5.0	0.0	0.0
COMMON		0.0	0.0
STANDARD			0.0

Equal 2" Moderate 4" Strong 6" V. Strong 8" Extreme

Calculate Abandon Invert Enter

Product Structure Link Elem

Value Units L/O D R L/E C/F S/N E/S S/N E/S S/N E/S S/N E/S

FIG. 6D